WHAT IS CLAIMED IS:

1. An apparatus for embedding a watermark into contents data, comprising:

pattern generating means for generating bits representing a predetermined bit pattern corresponding to a watermark;

specified-bit detecting means for detecting bits in original picture data as specified bits into which a watermark can be embedded;

calculating means for calculating a desired bit pattern represented by the specified bits in response to the predetermined bit pattern and a specified bit pattern, wherein the desired bit pattern can be converted into the specified bit pattern by given logical operation with the predetermined bit pattern; and

mixing means for changing the specified bits to represent the desired bit pattern to convert the original picture data into watermark-embedded picture data.

2. An apparatus as recited in claim 1, wherein the predetermined bit pattern and the specified bit pattern remain unchanged when being rotated through one of 90, 180, and 270 degrees.

3. A method of embedding a watermark into contents data, comprising the steps of:

generating bits representing a predetermined bit pattern

corresponding to a watermark;

detecting bits in original picture data as specified bits into which a watermark can be embedded;

calculating a desired bit pattern represented by the specified bits in response to the predetermined bit pattern and a specified bit pattern, wherein the desired bit pattern can be converted into the specified bit pattern by given logical operation with the predetermined bit pattern; and

changing the specified bits to represent the desired bit pattern to convert the original picture data into watermark-embedded picture data.

4. A method as recited in claim 3, wherein the predetermined bit pattern and the specified bit pattern remain unchanged when being rotated through one of 90, 180, and 270 degrees.

5. An apparatus for reproducing a watermark from watermarked contents data, comprising:

pattern generating means for generating bits representing a predetermined bit pattern;

operation means for selecting specified bits among bits in watermark-added picture data, for repetitively changing the currently-selected specified bits from ones to others, and for executing given logical operation between the predetermined bit pattern and a bit pattern represented by the currently-selected specified bits;

embedding-position detecting means for deciding whether or not a result of the given logical operation is equal to a specified bit pattern, and for, when the result of the given logical operation is equal to the specified bit pattern, deciding that the currently-selected specified bits correspond to a watermark-embedded region; and

converting means for changing one of a luminance and a color hue represented by a portion of the watermark-added picture data which corresponds to one of the watermark-embedded region and a region adjoining the watermark-embedded region.

6. An apparatus as recited in claim 5, wherein the predetermined bit pattern and the specified bit pattern remain unchanged when being rotated through one of 90, 180, and 270 degrees.

7. A method of reproducing a watermark from watermarked contents data, comprising the steps of:

generating bits representing a predetermined bit pattern;

selecting specified bits among bits in watermark-added picture data;

repetitively changing the currently-selected specified bits from ones to others;

executing given logical operation between the predetermined bit pattern and a bit pattern represented by the currently-selected specified bits;

deciding whether or not a result of the given logical operation is equal to a specified bit pattern;

when it is decided that the result of the given logical operation is equal to the specified bit pattern, deciding that the currently-selected specified bits correspond to a watermark-embedded region; and

changing one of a luminance and a color hue represented by a portion of the watermark-added picture data which corresponds to one of the watermark-embedded region and a region adjoining the watermark-embedded region.

8. A method as recited in claim 7, wherein the predetermined bit pattern and the specified bit pattern remain unchanged when being rotated through one of 90, 180, and 270 degrees.

9. An apparatus for embedding a watermark into contents data, comprising:

pattern generating means for generating bits representing a fixed bit pattern;

embedding-position deciding means for deciding a watermark-embedding position with respect to original picture data;

random-number generating means for generating random-number data representing a random number;

calculating means for calculating a desired bit pattern represented by specified bits in response to the fixed bit pattern

and a specified bit pattern, the specified bits being among bits in a first portion of the original picture data which corresponds to the watermark-embedding position, wherein the desired bit pattern can be converted into the specified bit pattern by given logical operation with the fixed bit pattern;

operation means for executing given logical operation between watermark data and the random-number data; and

mixing means for changing the specified bits to represent the desired bit pattern, and for embedding a result of the given logical operation in a second portion of the original picture data which corresponds to the watermark-embedding position and which adjoins the first portion of the original picture data.

10. An apparatus as recited in claim 9, wherein the watermark-embedding position is composed of sub positions dispersing in a frame.

11. An apparatus as recited in claim 9, wherein the embedding-position deciding means comprises means for dividing the original picture data into equal-size blocks, means for calculating a degree of a complexity of a picture portion represented by each of the equal-size blocks, means for selecting ones among the equal-size blocks which correspond to calculated complexity degrees equal to or greater than a prescribed value, and means for deciding the watermark-embedding position in response to the selected ones of the equal-size blocks.

12. A method of embedding a watermark into contents data, comprising the steps of:

generating bits representing a fixed bit pattern;

deciding a watermark-embedding position with respect to original picture data;

generating random-number data representing a random number;

calculating a desired bit pattern represented by specified bits in response to the fixed bit pattern and a specified bit pattern, the specified bits being among bits in a first portion of the original picture data which corresponds to the watermark-embedding position, wherein the desired bit pattern can be converted into the specified bit pattern by given logical operation with the fixed bit pattern;

executing given logical operation between watermark data and the random-number data; and

changing the specified bits to represent the desired bit pattern, and embedding a result of the given logical operation in a second portion of the original picture data which corresponds to the watermark-embedding position and which adjoins the first portion of the original picture data.

13. An apparatus for reproducing a watermark from watermarked contents data, comprising:

pattern generating means for generating bits representing a

fixed bit pattern;

random-number generating means for generating random-number data representing a random number;

first operation means for selecting specified bits among bits in watermark-added picture data, for repetitively changing the currently-selected specified bits from ones to others, and for executing given logical operation between the fixed bit pattern and a bit pattern represented by the currently-selected specified bits;

embedding-position detecting means for deciding whether or not a result of the given logical operation by the first operation means is equal to a specified bit pattern, and for, when the result of the given logical operation by the first operation means is equal to the specified bit pattern, deciding that the currently-selected specified bits correspond to a first part of a watermark-embedded position; and

second operation means for executing given logical operation between the random-number data and a portion of the watermark-added picture data which corresponds to a second part of the watermark-embedded position different from the first part thereof to reproduce watermark data from the watermark-added picture data.

14. A method of reproducing a watermark from watermarked contents data, comprising the steps of:

generating bits representing a fixed bit pattern;

generating random-number data representing a random

number;

selecting specified bits among bits in watermark-added picture data;

repetitively changing the currently-selected specified bits from ones to others;

executing given logical operation between the fixed bit pattern and a bit pattern represented by the currently-selected specified bits;

deciding whether or not a result of the given logical operation is equal to a specified bit pattern;

when the result of the given logical operation is equal to the specified bit pattern, deciding that the currently-selected specified bits correspond to a first part of a watermark-embedded position; and

executing given logical operation between the random-number data and a portion of the watermark-added picture data which corresponds to a second part of the watermark-embedded position different from the first part thereof to reproduce watermark data from the watermark-added picture data.

15. An apparatus for embedding a watermark into contents data, comprising:

pattern generating means for generating bits representing a fixed two-dimensional bit pattern;

embedding-position deciding means for deciding a two-dimensional watermark-embedding region with respect to original

picture data;

random-number generating means for generating random-number data representing a random number;

calculating means for calculating a desired two-dimensional bit pattern represented by specified bits in response to the fixed two-dimensional bit pattern and a specified two-dimensional bit pattern, the specified bits being among bits in a first portion of the original picture data which corresponds to a first part of the two-dimensional watermark-embedding region, wherein the desired two-dimensional bit pattern can be converted into the specified two-dimensional bit pattern by given logical operation with the fixed two-dimensional bit pattern;

operation means for executing given logical operation between watermark data and the random-number data; and

mixing means for changing the specified bits to represent the desired two-dimensional bit pattern, and for embedding a result of the given logical operation in a second portion of the original picture data which corresponds to a second part of the two-dimensional watermark-embedding region different from the first part thereof.

16. An apparatus as recited in claim 15, wherein the first part of the two-dimensional watermark-embedding region is a central part thereof, and the second part of the two-dimensional watermark-embedding region is an outer part thereof which surrounds the central part thereof.

17. An apparatus as recited in claim 15, wherein the two-dimensional watermark-embedding region corresponds to a portion of the original picture data which represents one of (1) a picture portion having a degree of a complexity equal to or greater than a prescribed value and (2) a picture portion including a contour.

18. An apparatus as recited in claim 15, wherein the fixed two-dimensional bit pattern and the specified two-dimensional bit pattern remain unchanged when being rotated through one of 90, 180, and 270 degrees.

19. A method of embedding a watermark into contents data, comprising the steps of:

generating bits representing a fixed two-dimensional bit pattern;

deciding a two-dimensional watermark-embedding region with respect to original picture data;

generating random-number data representing a random number;

calculating a desired two-dimensional bit pattern represented by specified bits in response to the fixed two-dimensional bit pattern and a specified two-dimensional bit pattern, the specified bits being among bits in a first portion of the original picture data which corresponds to a first part of the two-dimensional watermark-embedding region, wherein the desired two-

dimensional bit pattern can be converted into the specified two-dimensional bit pattern by given logical operation with the fixed two-dimensional bit pattern;

executing given logical operation between watermark data and the random-number data; and

changing the specified bits to represent the desired two-dimensional bit pattern, and embedding a result of the given logical operation in a second portion of the original picture data which corresponds to a second part of the two-dimensional watermark-embedding region different from the first part thereof.

20. A method as recited in claim 19, wherein the fixed two-dimensional bit pattern and the specified two-dimensional bit pattern remain unchanged when being rotated through one of 90, 180, and 270 degrees.

21. An apparatus for reproducing a watermark from watermarked contents data, comprising:

pattern generating means for generating bits representing a fixed two-dimensional bit pattern;

random-number generating means for generating random-number data representing a random number;

first operation means for selecting specified bits among bits in watermark-added picture data, for repetitively changing the currently-selected specified bits from ones to others, and for executing given logical operation between the fixed two-dimensional

bit pattern and a two-dimensional bit pattern represented by the currently-selected specified bits;

embedding-position detecting means for deciding whether or not a result of the given logical operation by the first operation means is equal to a specified two-dimensional bit pattern, and for, when the result of the given logical operation by the first operation means is equal to the specified two-dimensional bit pattern, deciding that the currently-selected specified bits correspond to a two-dimensional watermark-embedded region; and

second operation means for executing given logical operation between the random-number data and a portion of the watermark-added picture data which corresponds to the two-dimensional watermark-embedded region to reproduce watermark data from the watermark-added picture data.

22. An apparatus as recited in claim 21, wherein the embedding-position detecting means comprises means for, when the result of the given logical operation by the first operation means is equal to the specified two-dimensional bit pattern, deciding that the currently-selected specified bits correspond to a first part of the two-dimensional watermark-embedded region, and the second operation means comprises means for executing given logical operation between the random-number data and a portion of the watermark-added picture data which corresponds to a second part of the two-dimensional watermark-embedded region different from the first part thereof to reproduce watermark data from the

watermark-added picture data.

23. An apparatus as recited in claim 21, wherein the fixed two-dimensional bit pattern and the specified two-dimensional bit pattern remain unchanged when being rotated through one of 90, 180, and 270 degrees.

24. A method of reproducing a watermark from watermarked contents data, comprising the steps of:

generating bits representing a fixed two-dimensional bit pattern;

generating random-number data representing a random number;

selecting specified bits among bits in watermark-added picture data;

repetitively changing the currently-selected specified bits from ones to others;

executing given logical operation between the fixed two-dimensional bit pattern and a two-dimensional bit pattern represented by the currently-selected specified bits;

deciding whether or not a result of the given logical operation is equal to a specified two-dimensional bit pattern;

when the result of the given logical operation is equal to the specified two-dimensional bit pattern, deciding that the currently-selected specified bits correspond to a two-dimensional watermark-embedded region; and

executing given logical operation between the random-number data and a portion of the watermark-added picture data which corresponds to the two-dimensional watermark-embedded region to reproduce watermark data from the watermark-added picture data.

25. A method as recited in claim 24, wherein the fixed two-dimensional bit pattern and the specified two-dimensional bit pattern remain unchanged when being rotated through one of 90, 180, and 270 degrees.